REMARKS

The Office Action was mailed in this case on March 28, 2006, making a response due on or before June 28, 2006. Since this response is being submitted in a timely manner, no additional fee is thought to be due at this time. If any additional fee is due for the continued prosecution of this application, please charge the same to Applicant's Deposit Account No. 50-2555 (Whitaker, Chalk, Swindle & Sawyer, LLP).

Examiner indicated allowability of claims 1-17 was withdrawn in view of the newly discovered references to Allyne(U.S. Patent No. 1,347,476), Panyard(U.S. Patent No. 4,986,230), and Squires(U.S. Patent No. 1,966,053) or Lynall(U.S. Patent No. 2,583,270). Applicant has amended the language of the remaining independent claims in view of the Examiner's remarks and reconsideration of remaining Claims 1-2, 4-8 and 10-17 is requested in view of the arguments which follow.

In the latest Office Action, the Examiner has rejected Applicant's Claims 1-6 under 35 U.S.C. §103(a) based upon the reference to Allyne in view of Panyard, Squires and Lynall. The Examiner cites the Allyne reference to show a cylinder liner having a flanged lip formed from a variety of metals "through any known technique" (page 2, paragraph 3 of the Office Action). The Examiner recognizes that the Allyne reference fails to show a cylinder liner formed of carbon alloy steel. Secondly, the Examiner then cites the Panyard reference to show a cylinder liner formed from carbon alloy steel. Finally, the Examiner cites the Squires and the Lynall references, arguing that it is known to construct a metallic cylindrical member having flanges through the use of a cold forging step. The Examiner notes that, with regard to Claims 3-6, the carbon content of the steel and the internal diameter of the liner would be obvious choices where the general conditions of the claim are known in the art.

There are a number of reasons why the combination of art suggested by the Examiner would fail to teach one how to arrive at Applicant's presently claimed invention. The primary reference cited by the Examiner, Allyne, fails to teach or suggest Applicant's presently claimed invention either alone or in combination with the other cited art. It is very clear from reading Allyne that the alloy metal material is being used for the overall cylinder head (shown as 2 in Figures 3 and 4 of Allyne's drawings). The "liner" in Allyne is shown as the element 5 and is preferably formed of iron (see, e.g., Col. 3, lines 72-73). As such, the teaching of Allyne merely represents the state of the prior art toward which Applicant's invention was directed. Allyne wants an iron liner to fit within a surrounding aluminum motor cylinder casting because the co-efficient of expansion of aluminum is greater than that of iron (Col. 3, lines 102-104). As a result, "there is no danger that the aluminum sections surrounding each iron liner and valve seat insert will not expand sufficiently to maintain the proper relations of these correlated parts, despite the fact that the iron or steel is subjected to higher temperatures than the aluminum or aluminum alloy" (Col. 3, lines 105-110).

The only teaching in Allyne as to how the iron liner is formed is the general statement that "the liner may be constructed in any suitable manner as by drawing, turning, boring or grinding..." (Col. 4, lines 44-45). He nowhere suggests that a carbon alloy steel cylinder having a carbon content of at least 25% (as called for in amended Claim 1) be cold forged in a hydraulic press, or that such a cold formed liner could be used to replace traditional iron liners.

The Examiner then combines the teaching of Panyard in an attempt to arrive at a cylinder liner formed of carbon alloy steel. However, even accepting the teaching of Panyard for what it represents, Applicant's invention, as defined in the amended claims, would not be met. Applicant's amended claims call for a cylinder liner having a carbon content of at least 25% (Claim 1), preferably at least 50% (Claim 4), and most preferably a cylinder liner formed of 1055 carbon alloy steel (Claim 5).

While Panyard recognizes that plain carbon steel may be low, moderate or high carbon, he prefers to utilize a "low carbon" 1020 steel (Col. 3, lines18-21). This is probably a function of the overall cylinder lining process employed by Panyard in which a slightly undersized cylinder (17 in Figure

1(a), is "circumferentially expanded" by the ball 14 (see Figure 1(c)) to more closely fit the internal cylinder diameter. A more workable steel material would be desirable in such a forming technique. Applicant's amended claims call for a cylindrical tube formed from carbon alloy steel of given starting dimensions, "the carbon alloy steel having a carbon content of at least 0.25% (Claim 1). Applicant's dependent claims, e.g., Claims 4 and 5, call for a carbon alloy steel having a carbon content of at least 0.50% or of being formed from a 1055 carbon alloy steel, respectively, as pointed out above. These limitations clearly distinguish the teaching of Panyard.

Applicant also respectfully traverses the contention of the Examiner that such numerical limits as the carbon content of the carbon alloy steel are obvious design choices, since the general conditions are known in the prior art. The Examiner will appreciate that, as a general starting point, plain steel (also know as carbon steel) is an alloy of iron, carbon, and other materials, such as chromium, manganese, nickel, and molybdenum. Carbon is the principal hardening element in steel and as the carbon content increases, the hardness generally increases while the ductility and weldability decreases. In general, steel is considered to be plain or carbon steel when no minimum content is specified, or when any element is added to obtain a desired effect. Carbon steel is more susceptible to corrosion than galvanized, aluminum, or stainless steel.

High-carbon steels are extremely strong but more brittle. This composition allows better responses to heat treatment and longer service life than medium-carbon steels. High-carbon steels have superior surface hardness resulting in high wear resistance. The AISI designations for high-carbon steel are: AISI 1055-1095, 1137-1151, and 1561-1572.

It was no accident that Applicant chose to specify a carbon alloy steel having a particular carbon content, namely a high carbon content. Applicant has married the prior art technique of cold forging with a particular steel starting material which allows forming an "upper flanged region which is integrally formed in the cold forging process" (Claim 1) and which thereby provides a cylinder liner suitable for its intended purpose in internal combustion engines. Rather than cold forging, Panyard

elected to utilize a "seating technique" and an initially undersized liner blank, likely necessitating the use of a lower carbon steel starting material.

Finally, with respect to Panyard, Applicant wishes to point out that this reference fails to teach or suggest the use of cold forming, since the Panyard reference deals with seating the liner within the cylinder bore, rather than providing a liner with a flanged lip, as in Applicant's method.

The combination of the Allyne and Panyard references suggested by the Examiner therefore lacks two elements of Applicant's amended claims, namely (1) that the cylinder liner be cold forged and (2) that the liner blank be formed of a high carbon alloy steel having at least 25% carbon content.

The Examiner then cites Squires and Lynall for the position that "it is known to construct a metallic cylindrical member having flanges through the step of cold forging in a press" (Office Action, page 3). The manufacturing process of Squires is used to formed propeller blades, a non-analogous field to that of forming cylinder liners for internal combustion engines. Further, the techniques taught by Squires differ significantly from those employed by Applicant. The propeller blank of Squires is first "heated to a workable plasticity" (Col. 2, lines95-97), rather than being cold formed. The whole object of the manufacturing process appears to be to "provide a bending operation" (Col. 1, lines 30-33) for the external radial flange root of the blade through "successive steps by a series of dies, each of which is adapted to continue the bending...." (Co9l. 1, lines 37-39). Applicant cold forms the cylinder liner in a hydraulic press in a single step by applying "500 to 1,000 tons of hydraulic force to the cylinder liner blank to cause the carbon alloy steel to flow into the flange cavity to form the flanged region of the liner body" (Claim 12).

The remaining reference cited by the Examiner to show cold forging is the Lynall reference. However, this reference deals with forming rivets from "any suitable malleable or deformable material, such as a heat-treated aluminum alloy" (Col 2, lines 18-20). The nature and use of a rivet differs drastically from a cylinder liner used in the internal combustion engine of a vehicle. Lynall uses a lightweight alloy like aluminum because he can easily stamp out hundreds or thousands of

rivets quickly and economically. They would never withstand the stresses in terms of heat and pressure that a cylinder liner in an internal combustion engine must withstand. The Lynall reference therefore nowhere teaches or suggests Applicant's use of a high carbon alloy steel starting blank.

The actual forming operations described in the Lynall reference also differ from Applicant's single step cold forging operation. Lynall utilizes a "preforming stroke", followed by re-insertion of the preformed blank into a die, after which a finishing punch assembly is utilized (see generally Col. 3, lines 17-38 of Lynall).

In summary, the Allyne reference merely represents the prior art iron casting process for engine cylinder liners. Panyard "seats" a cylinder liner within a cylinder but the liner blank is formed form a low carbon alloy steel and no "flanged region" is formed during the seating process. Regarding the Squires and Lynall references, the objects being formed in these references differ greatly from the cylinder liners being formed by Applicant's process. Squires is concerned with the production of a propeller blade while the Lynall reference deals with the manufacturing techniques of rivets, both of which areas of art are too diverse to be compared with Applicant's modification of a basic casting process for a cylinder liner. Because of their greatly differing applications, the manufacturing steps employed also differ from the techniques taught by Applicant, as outlined above.

Accordingly, Claims 1-2, 4-8 and 10-17 are thought to be allowable over the art of record and an early notification of the same would be appreciated.

Respectfully submitted,

Date: June 23, 2006

Charles D. Gunter, Jr., Reg. No. 29,386
Whitaker, Chalk, Swindle& Sawyer, LLP
301 Commerce St, Suite 3500
Fort Worth, Texas 76102
(817) 878-0504